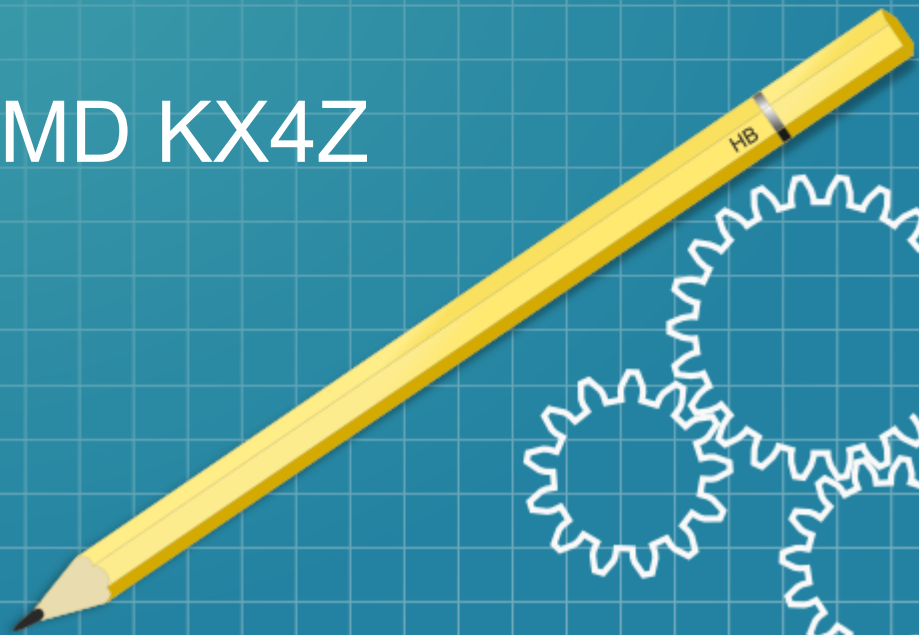
Making Printed Circuit Boards for your group

Gordon L. Gibby MD KX4Z



Why printed circuit boards?

- Even for experienced builders, reduce building time by 75% (30min/2 hrs) compared to point to point (our experience, sound interface, 2 builders)
- Solves the parts' support issue
- Can provide helpful ground plane
- Then mount on standoffs (Amazon) inside inexpensive metal cans.

Specialty Bottle

Classic Deep & Flat Tins

Clear Top Tins

Hinge Top Tins

Screw Top Tins

Square Tins

Tea and Storage Tins

Twist Top Tins

Slider Tins

Gold Tins

Tea Tins:

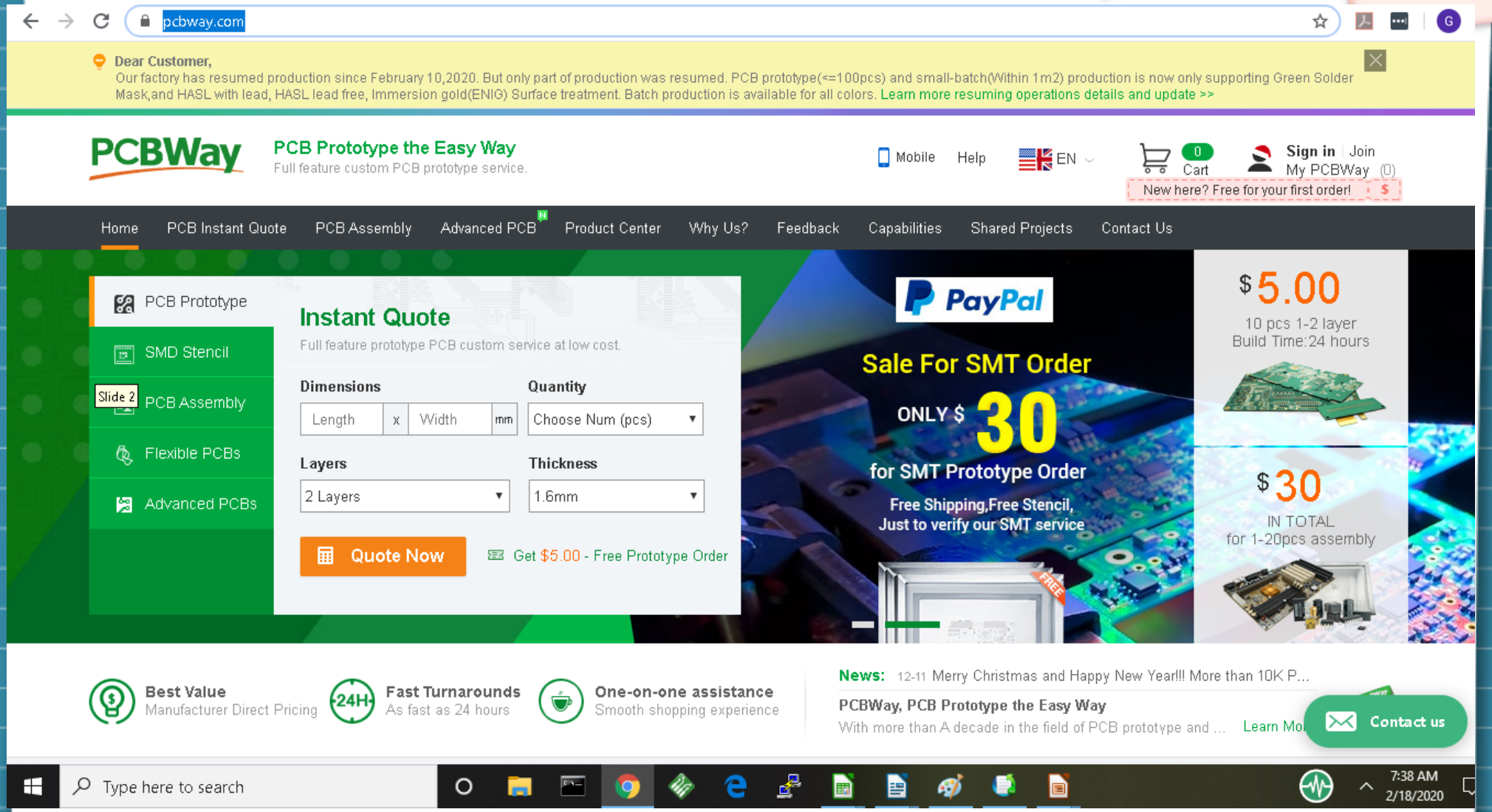
- https://www.specialtybottle.com/metal-tin-containers/tea

ID	DESCRIPTION	HEIGHT	WIDTH	UNIT PRICE w/ Cover UNDER CASE	UNIT PRICE w/ Cover CASE	UNIT PRICE w/ Cover 1,000+	ADD TO CART
TSQ2	2.5" Square Tea Tin with Slip Lid	2.5"	1.7"	$0.98	$0.75	$0.72	0 Add
TSQ4	3.8" Square Tea Tin with Slip Lid	3.8"	2.8"	$1.46	$1.30	$1.24	0 Add
TEAT4	4.3" Smooth Square Tea Tin with Slip Lid	4.3"	2.8"	$1.76	$1.43	$1.35	0 Add
TEAT5	5.1" Smooth Square Tea Tin with Slip Lid	5.1"	3.43"	$2.16	$1.84	$1.75	0 Add
TFLP5	5" Flip Top Tea Tin	5"	3.16"	$2.86	$2.38	$2.23	0 Add
TOVL5	5.4" Oval Stackable Tea Tin with Slip Lid	5.3"	2.72"	$2.49	$2.34	$1.85	0 Add

Printed Circuit Fabricators

- https://www.expresspcb.com/
  - Free software to create boards
  - 3 printed circuit boards.....$75
  - software simply will NOT produce Gerbers -- you are forced to use their services
- MULTIPLE firms in China that produce boards at FAR cheaper prices and accept “gerber” files
- I’ve used 2 such firms. https://www.pcbway.com/

pcbway.com


pcbway.com
Dear Customer,
Our factory has resumed production since February 10,2020. But only part of production was resumed. PCB prototype(<=100pcs) and small-batch(Within 1m2) production is now only supporting Green Solder Mask,and HASL with lead, HASL lead free, Immersion gold(ENIG) Surface treatment. Batch production is available for all colors. Learn more resuming operations details and update >>
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PCB Prototype the Easy Way
Full feature custom PCB prototype service.
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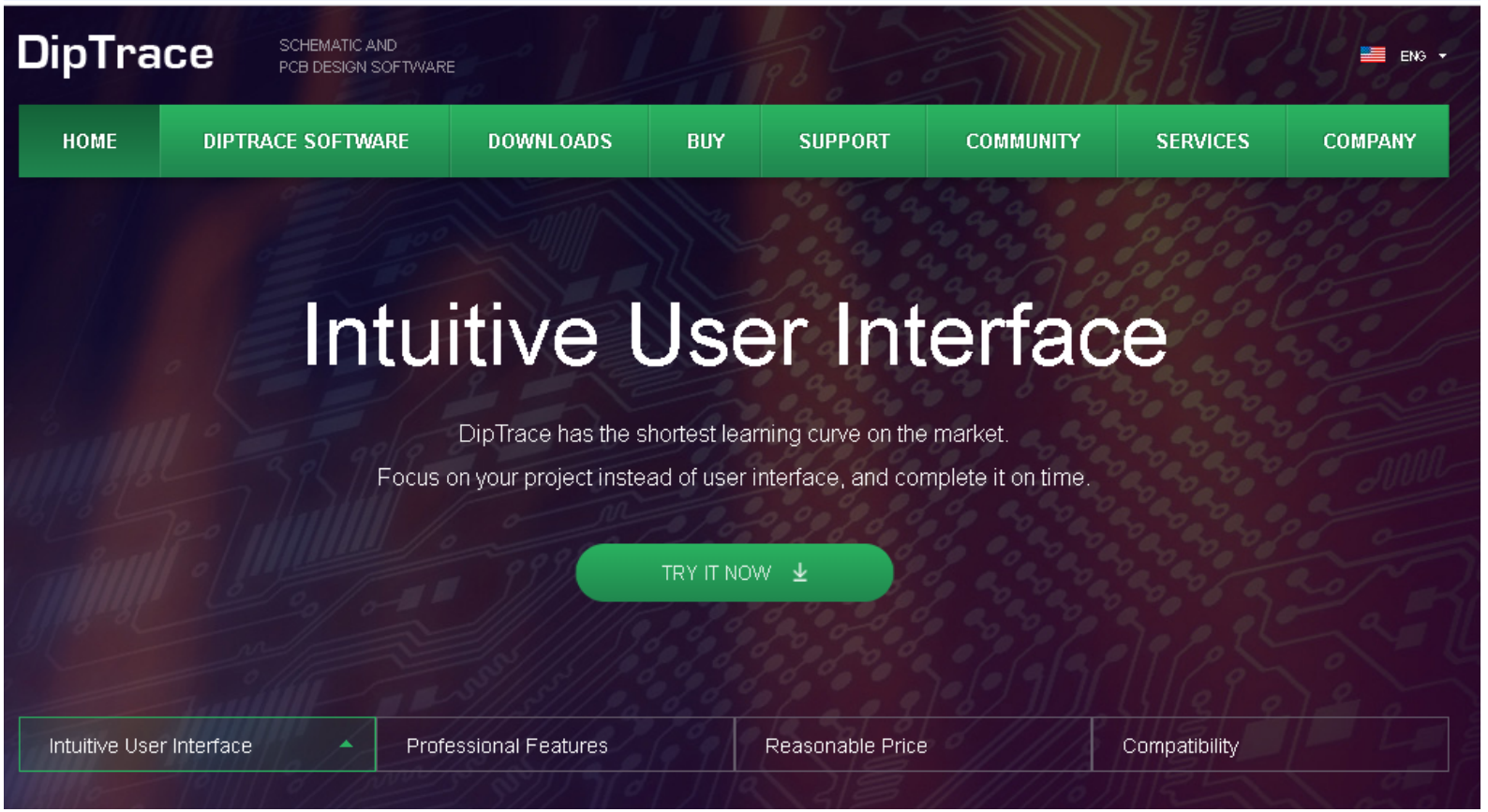
SMD Stencil
PCB Assembly
Flexible PCBs
Advanced PCBs
Slide 2
Instant Quote
Full feature prototype PCB custom service at low cost.
Dimensions
Length
x
Width
mm
Quantity
Choose Num (pcs)
Layers
2 Layers
Thickness
1.6mm
Quote Now
Get $5.00 - Free Prototype Order
PayPal
Sale For SMT Order
ONLY $ 30
for SMT Prototype Order
Free Shipping,Free Stencil,
Just to verify our SMT service
$5.00
10 pcs 1-2 layer
Build Time:24 hours
$30
IN TOTAL
for 1-20pcs assembly
Best Value
Manufacturer Direct Pricing
Fast Turnarounds
As fast as 24 hours
One-on-one assistance
Smooth shopping experience
News: 12-11 Merry Christmas and Happy New Year!!! More than 10K P...
PCBWay, PCB Prototype the Easy Way
With more than A decade in the field of PCB prototype and ...
Contact us
Type here to search
7:38 AM
2/18/2020

Get you going

- Purpose of talk is to get you set up to use this kind of service.
- DHL shipping -- boards typically on my doorstep SIX DAYS after order.
- 10 boards for $25-ish.

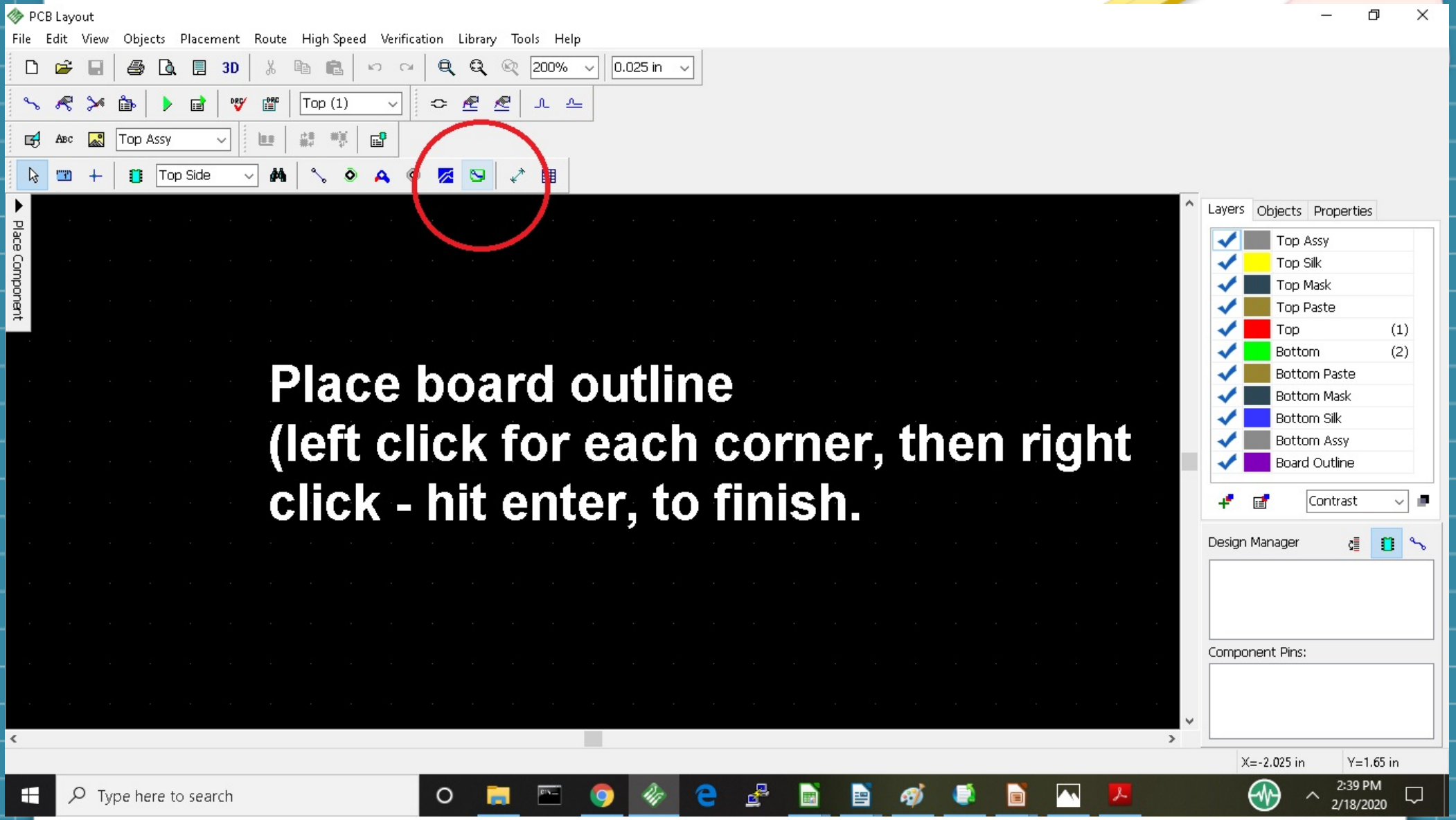
Multiple free layout programs

- https://diptrace.com/
-

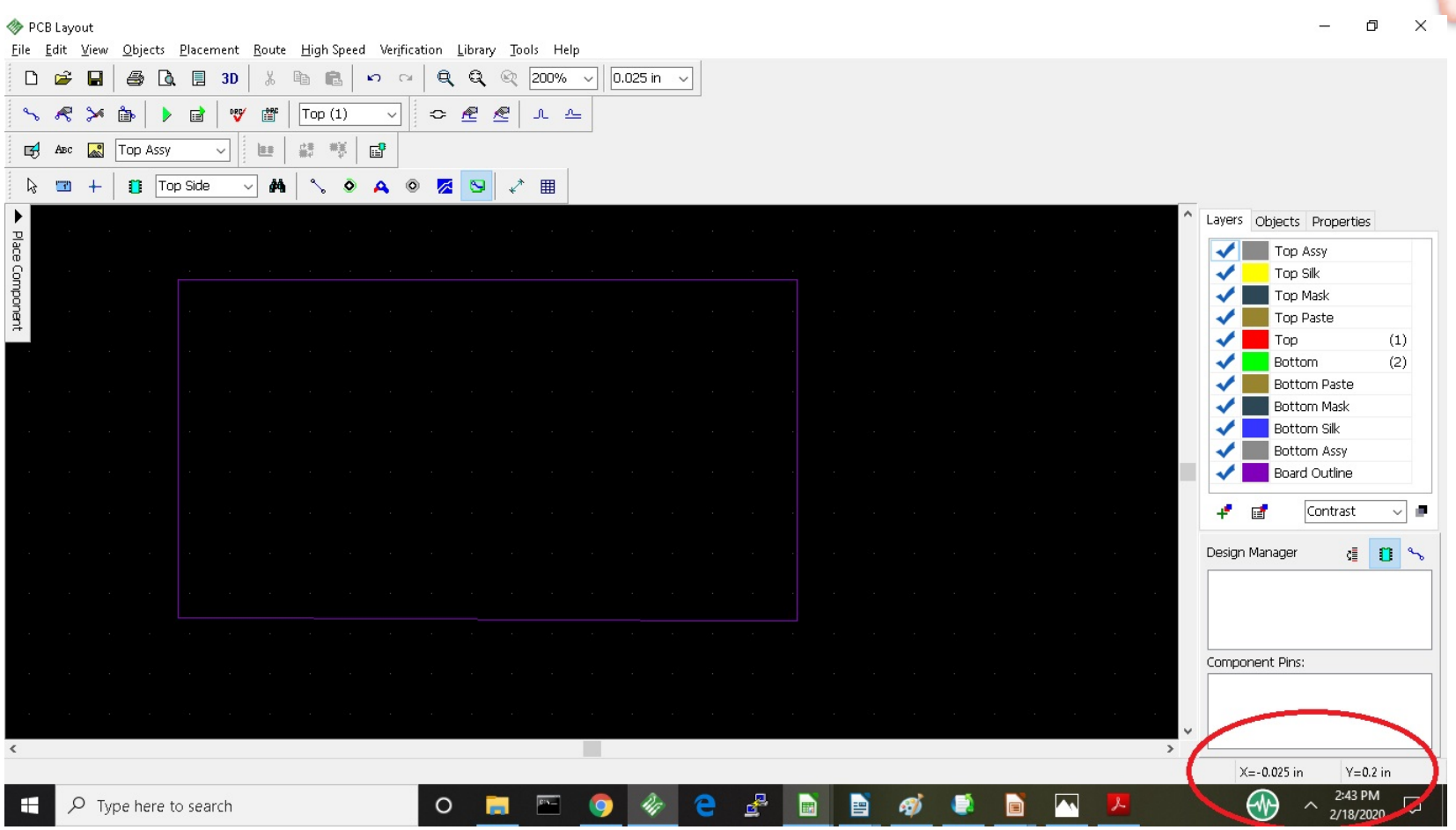


Limitations

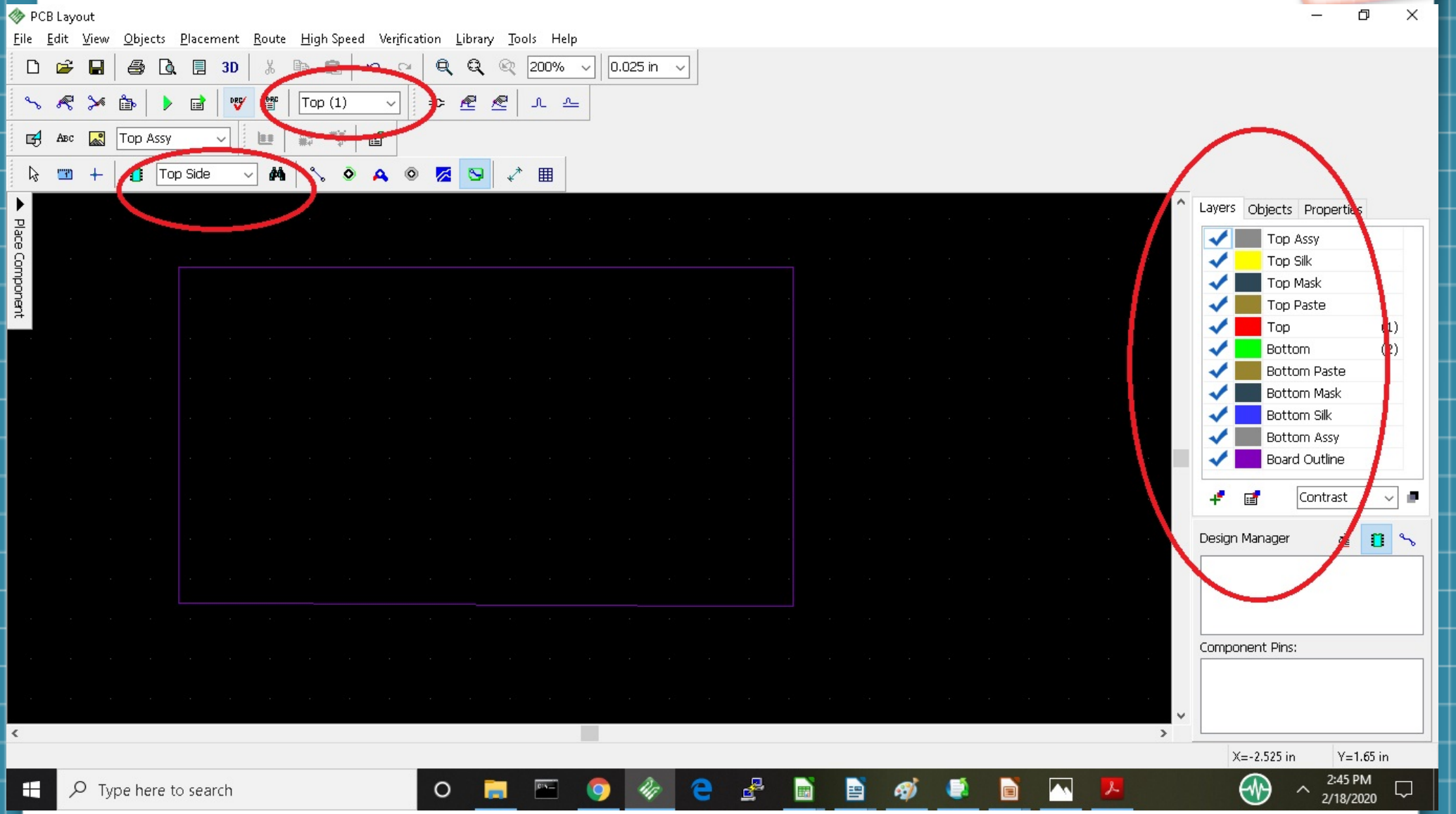
- Only teaching DIPTRACE (cheapest)
- Only talking about two layer boards
- Only talking about manually laid out boards
- Will try to include copper pours for RF shielding
- My knowledge is limited
- There may be better ways to do what I found.


PCB Layout
File Edit View Objects Placement Route High Speed Verification Library Tools Help
3D
200%
0.025 in
Top (1)
Top Assy
Top Side
Place Component
Place board outline
(left click for each corner, then right
click - hit enter, to finish.
Layers Objects Properties
Top Assy
Top Silk
Top Mask
Top Paste
Top (1)
Bottom (2)
Bottom Paste
Bottom Mask
Bottom Silk
Bottom Assy
Board Outline
Contrast
Design Manager
Component Pins:
X=-2.025 in
Y=1.65 in
Type here to search
2:39 PM
2/18/2020

(x,y) of mouse position

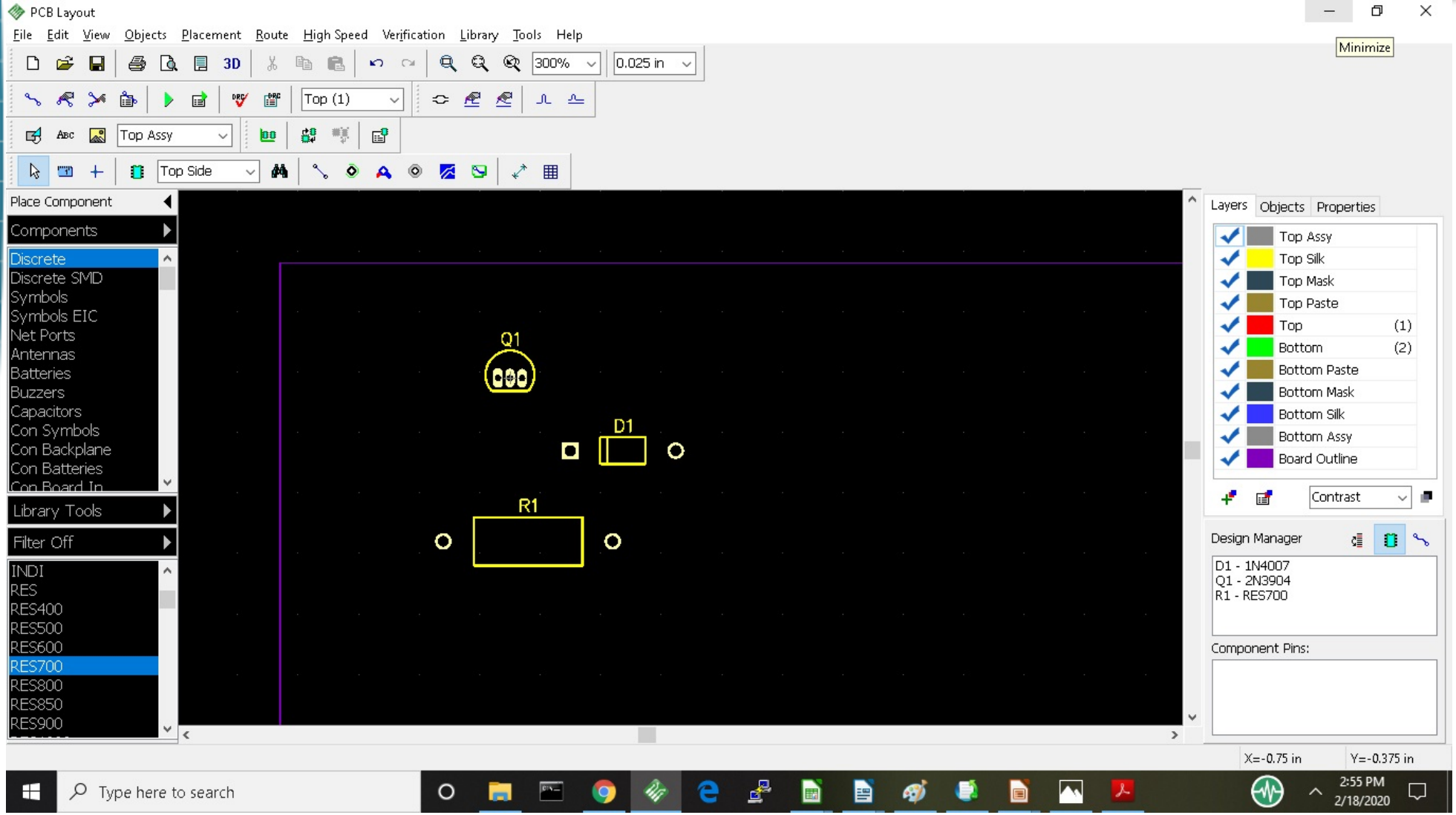


Layers - components, traces, views

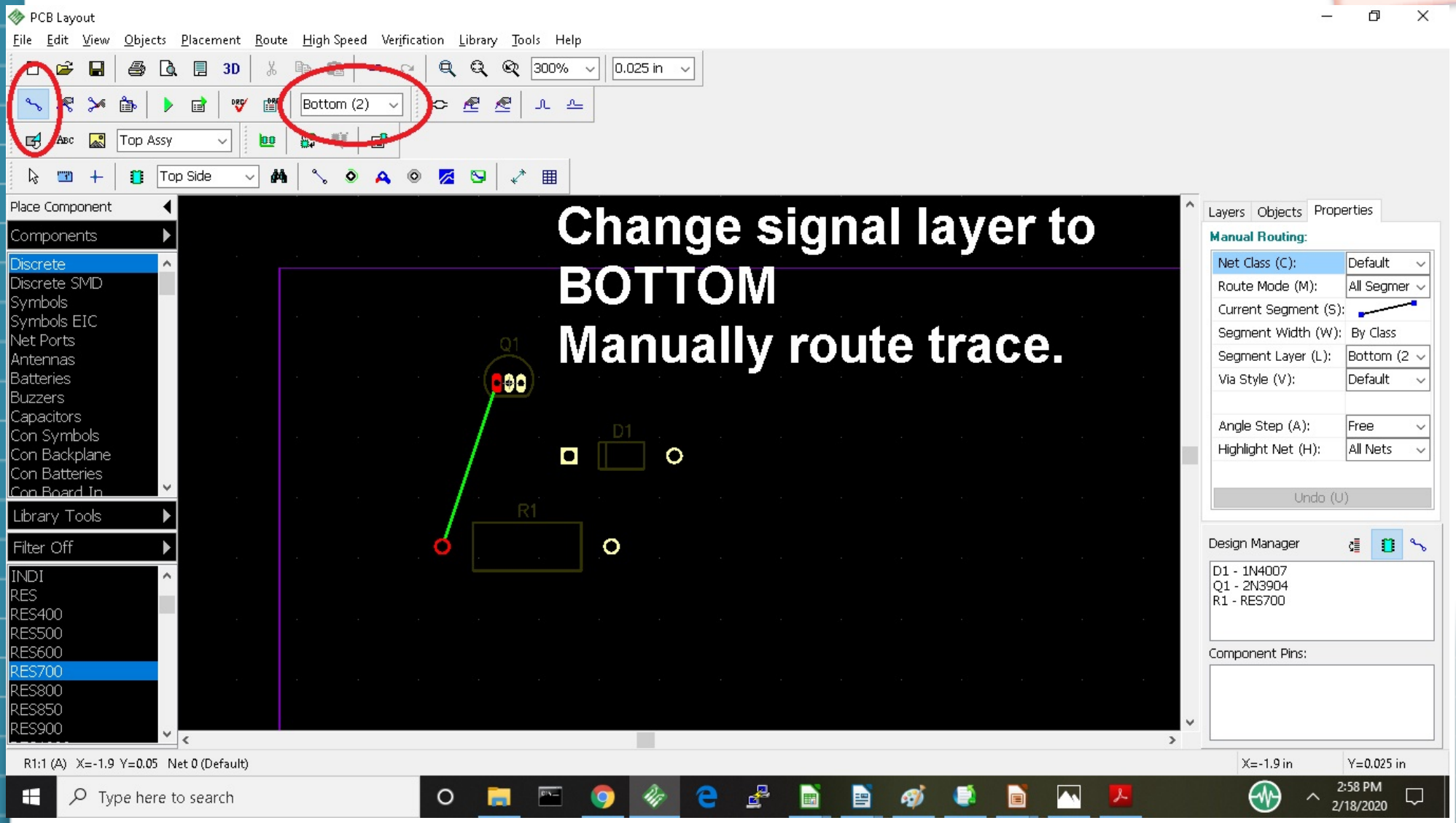


- COMPONENTS
  - Discrete -- includes C’s and R’s
  - Transistors -- lots of good ones
  - Diodes -- lots of good ones
  - You will have to find everything you want.
  -

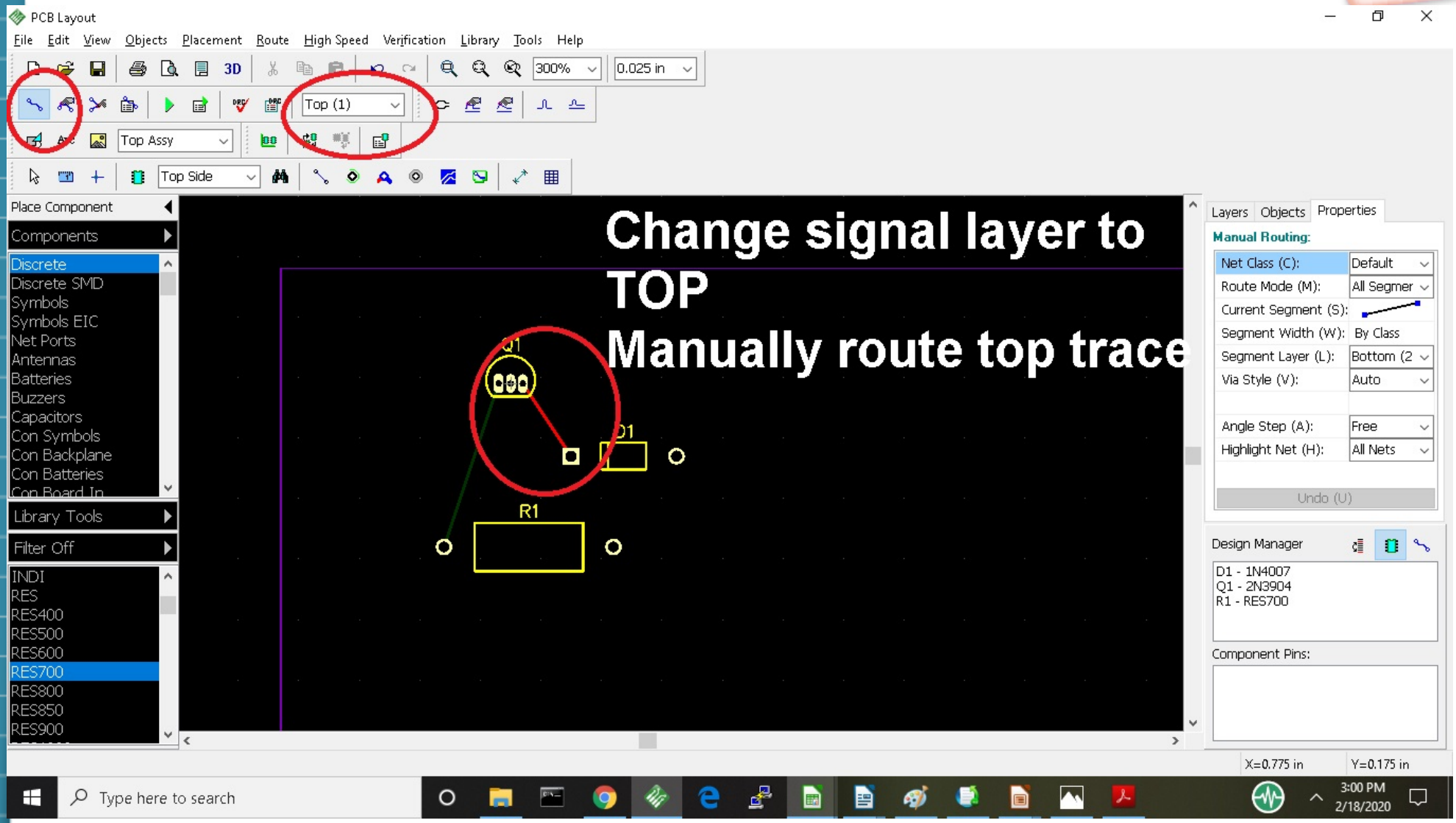
Put components on top side



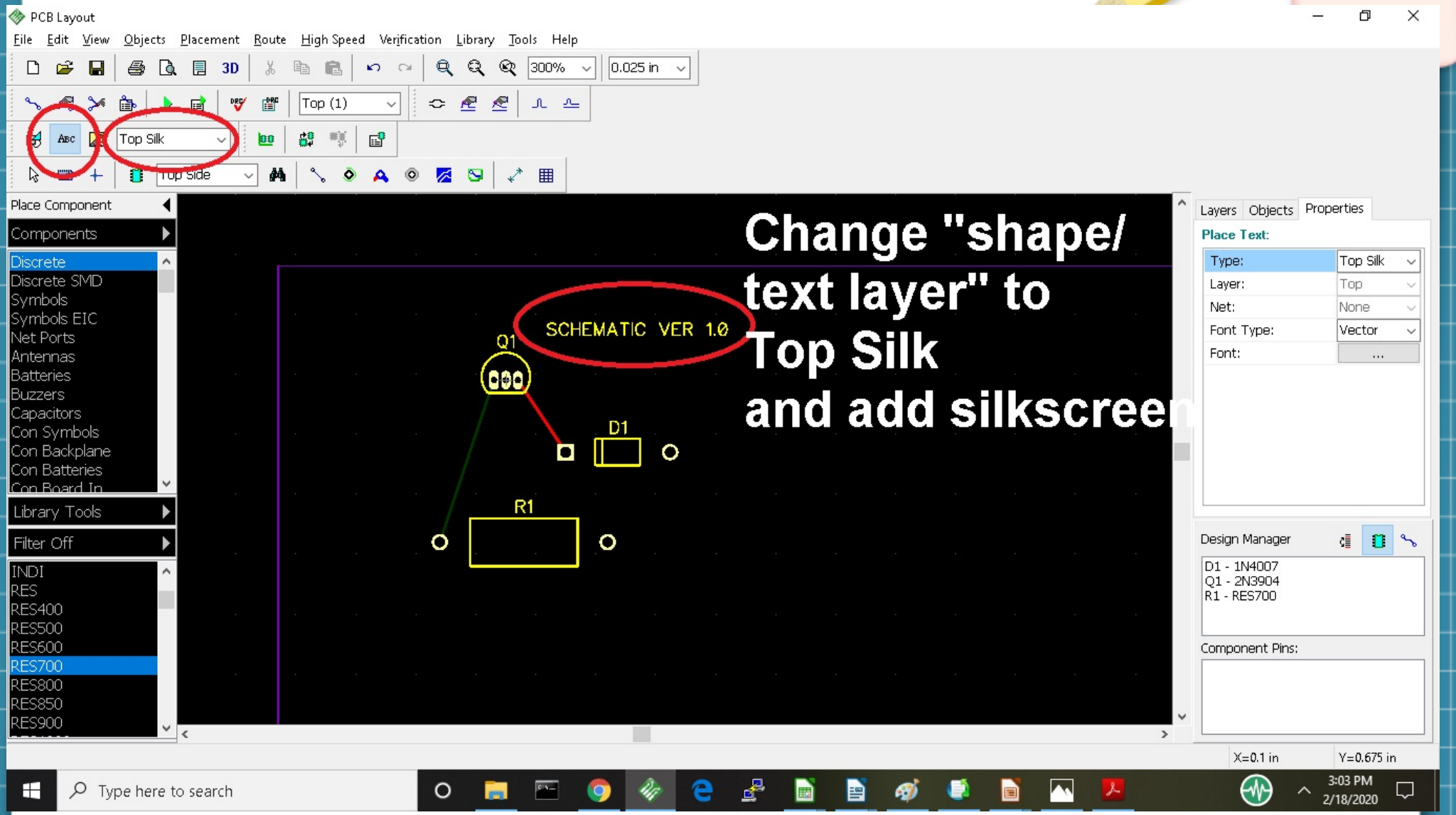
Manual bottom side trace



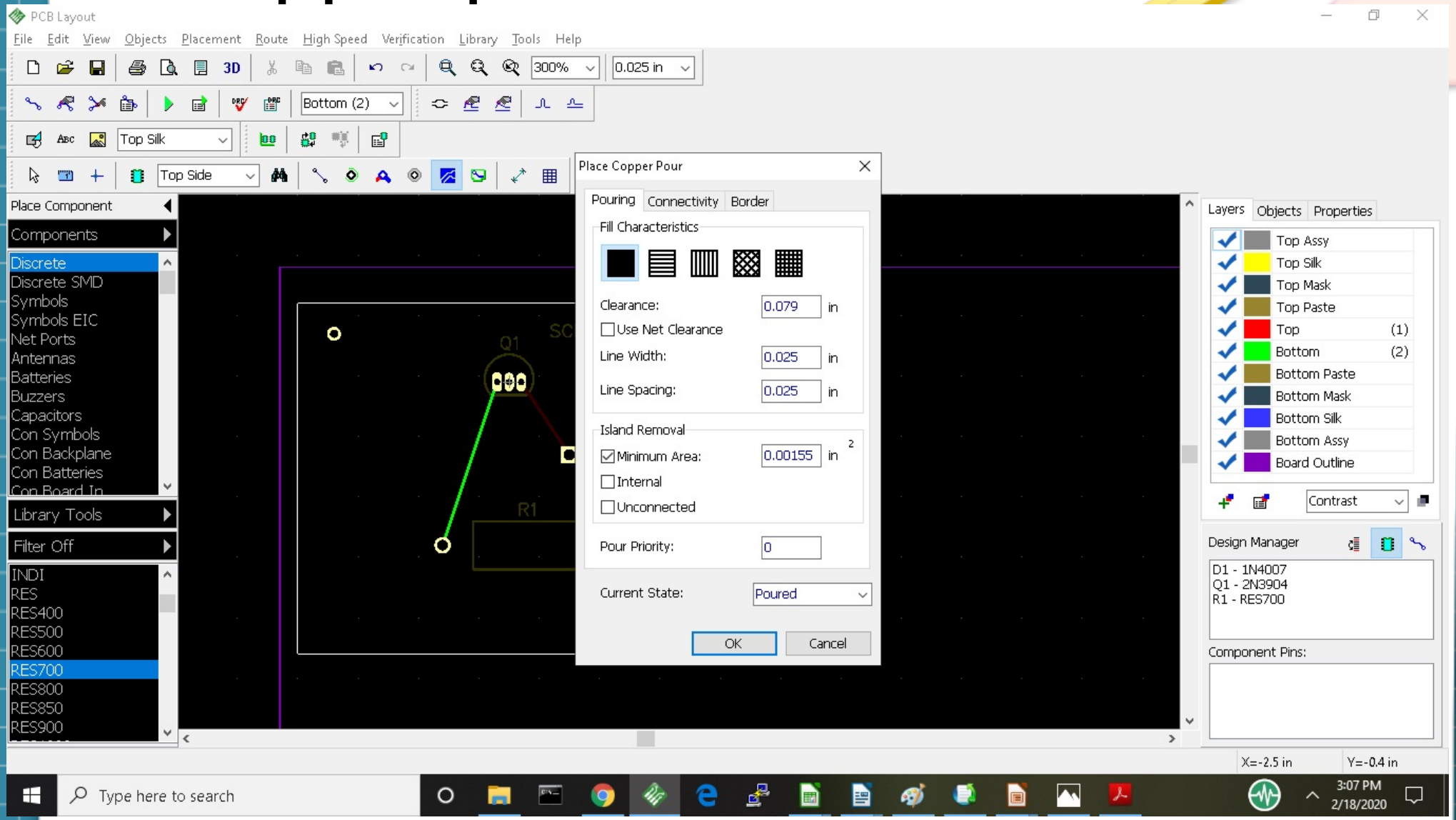
Manual top layer trace



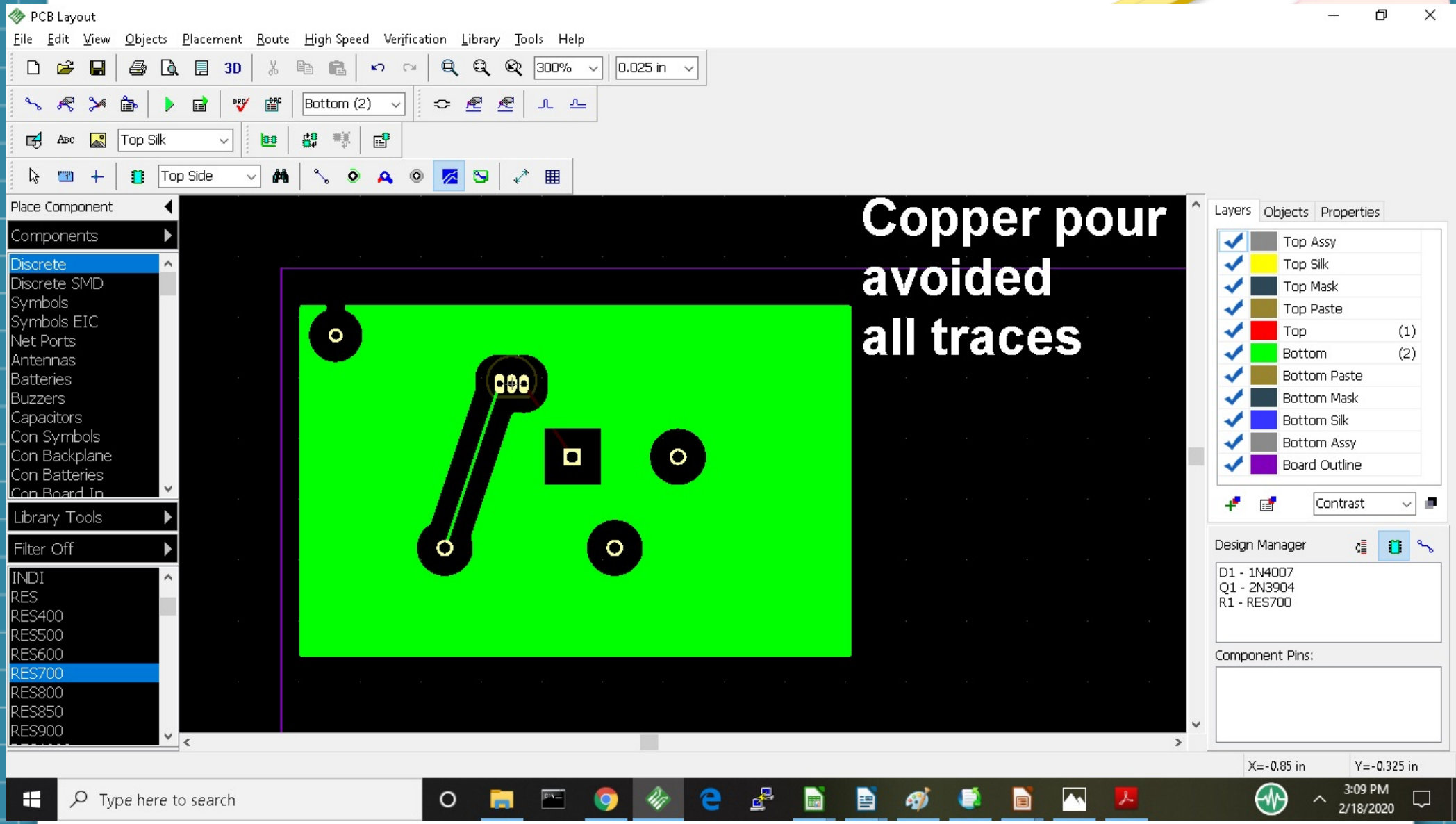
Silkscreen


PCB Layout
File Edit View Objects Placement Route High Speed Verification Library Tools Help
Top (1)
Top Silk
Top Side
Place Component
Components
Discrete
Discrete SMD
Symbols
Symbols EIC
Net Ports
Antennas
Batteries
Buzzers
Capacitors
Con Symbols
Con Backplane
Con Batteries
Library Tools
Filter Off
INDI
RES
RES400
RES500
RES600
RES700
RES800
RES850
RES900
SCHEMATIC VER 1.0
Q1
D1
R1
Change "shape/ text layer" to Top Silk and add silkscreen
Layers Objects Properties
Place Text:
Type: Top Silk
Layer: Top
Net: None
Font Type: Vector
Font: ...
Design Manager
D1 - 1N4007
Q1 - 2N3904
R1 - RES700
Component Pins:
X=0.1 in
Y=0.675 in
Type here to search
3:03 PM
2/18/2020

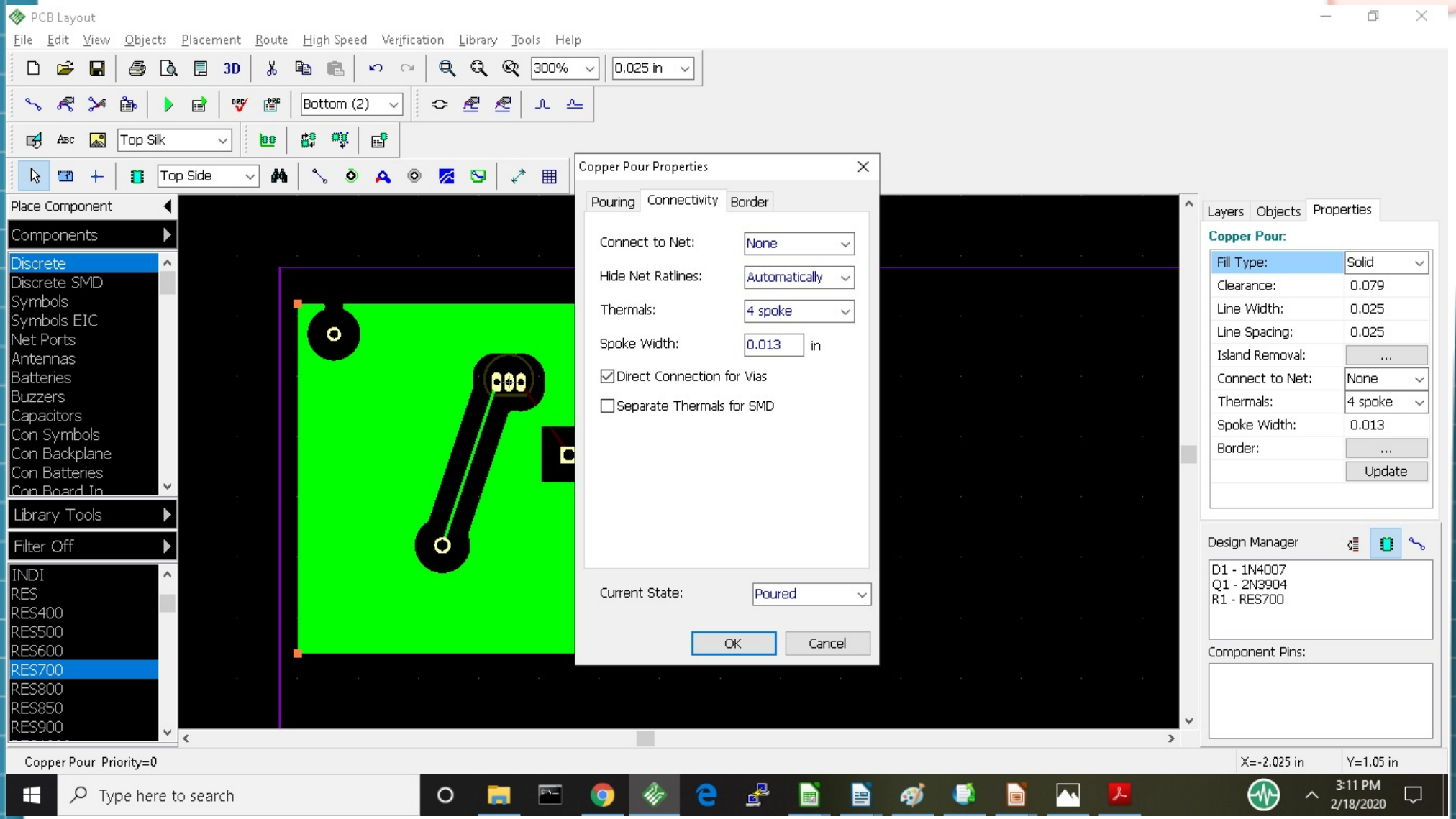
copper pour: like board outline



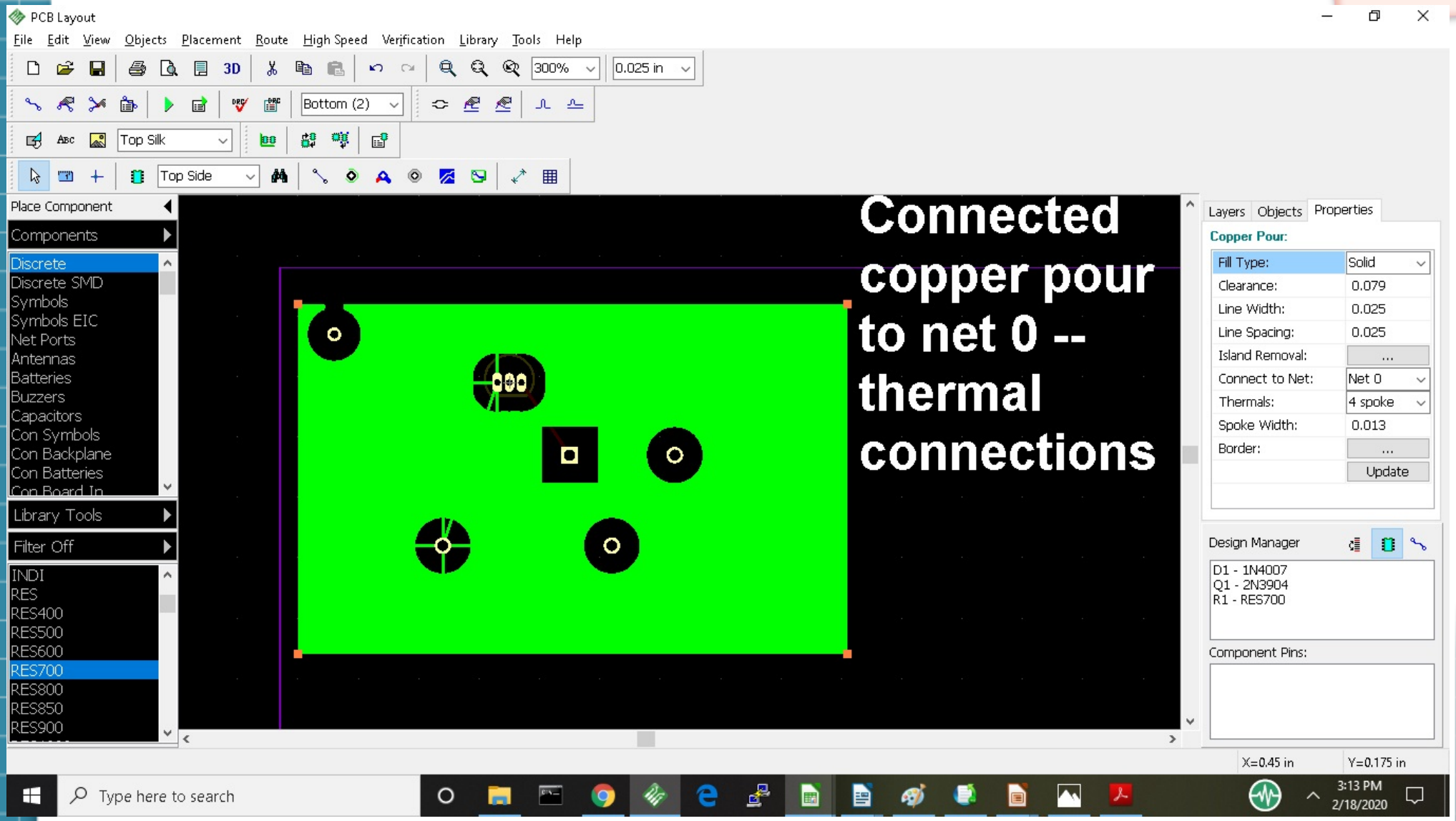
avoids traces



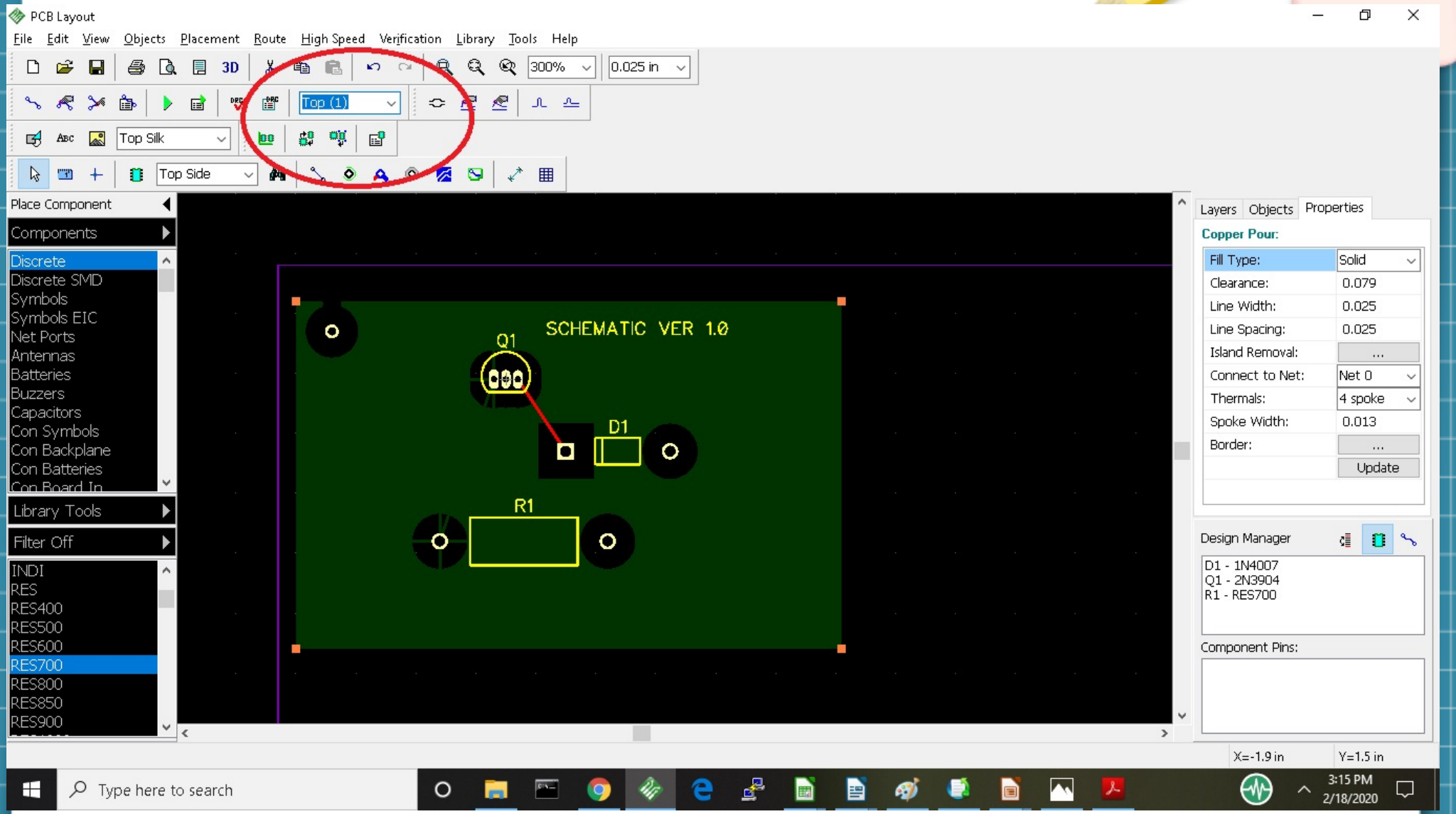
Right-Click Properties: not conn.



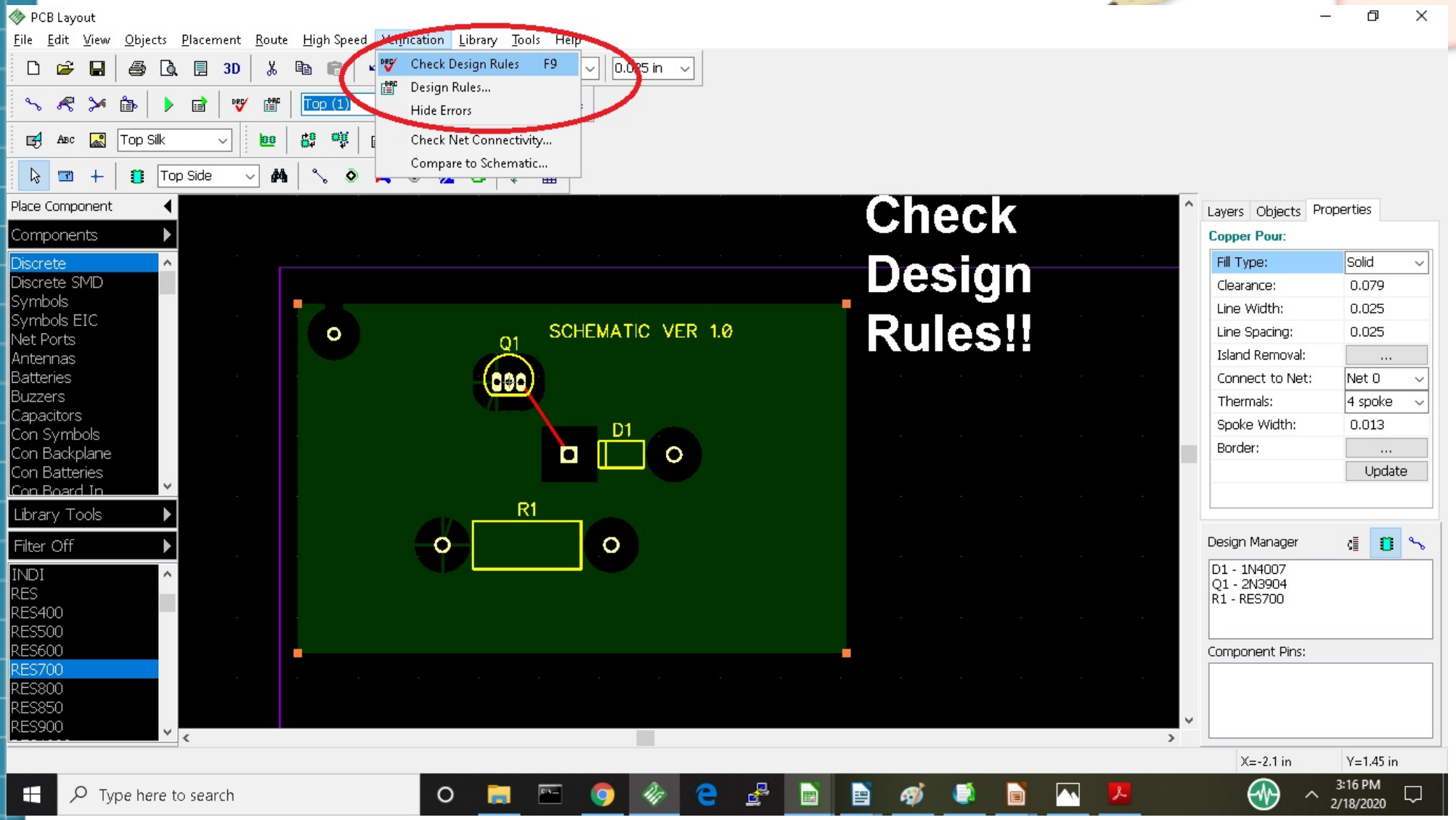
connect pour to net 0



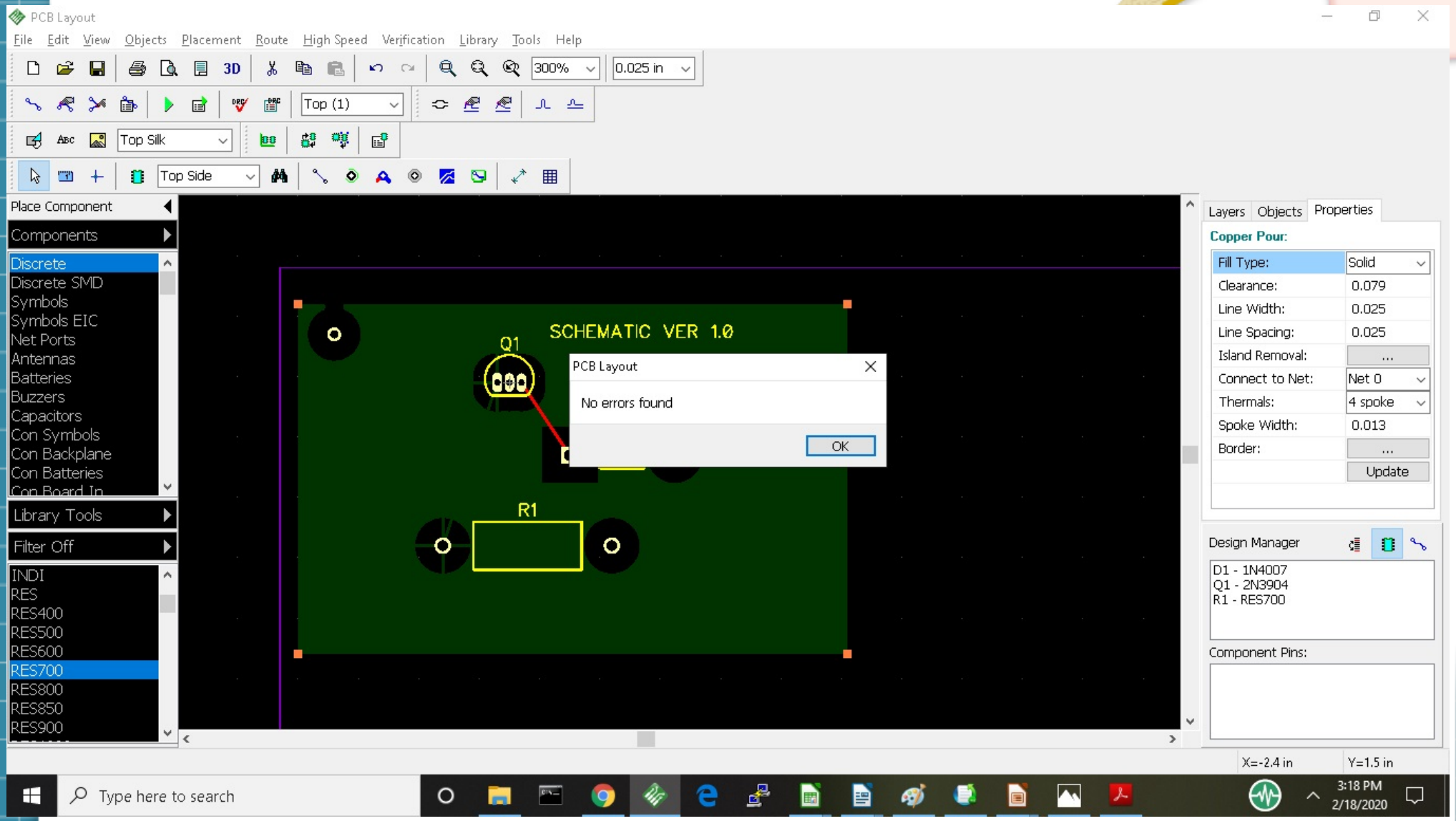
back to top view



check design rules!



No errors!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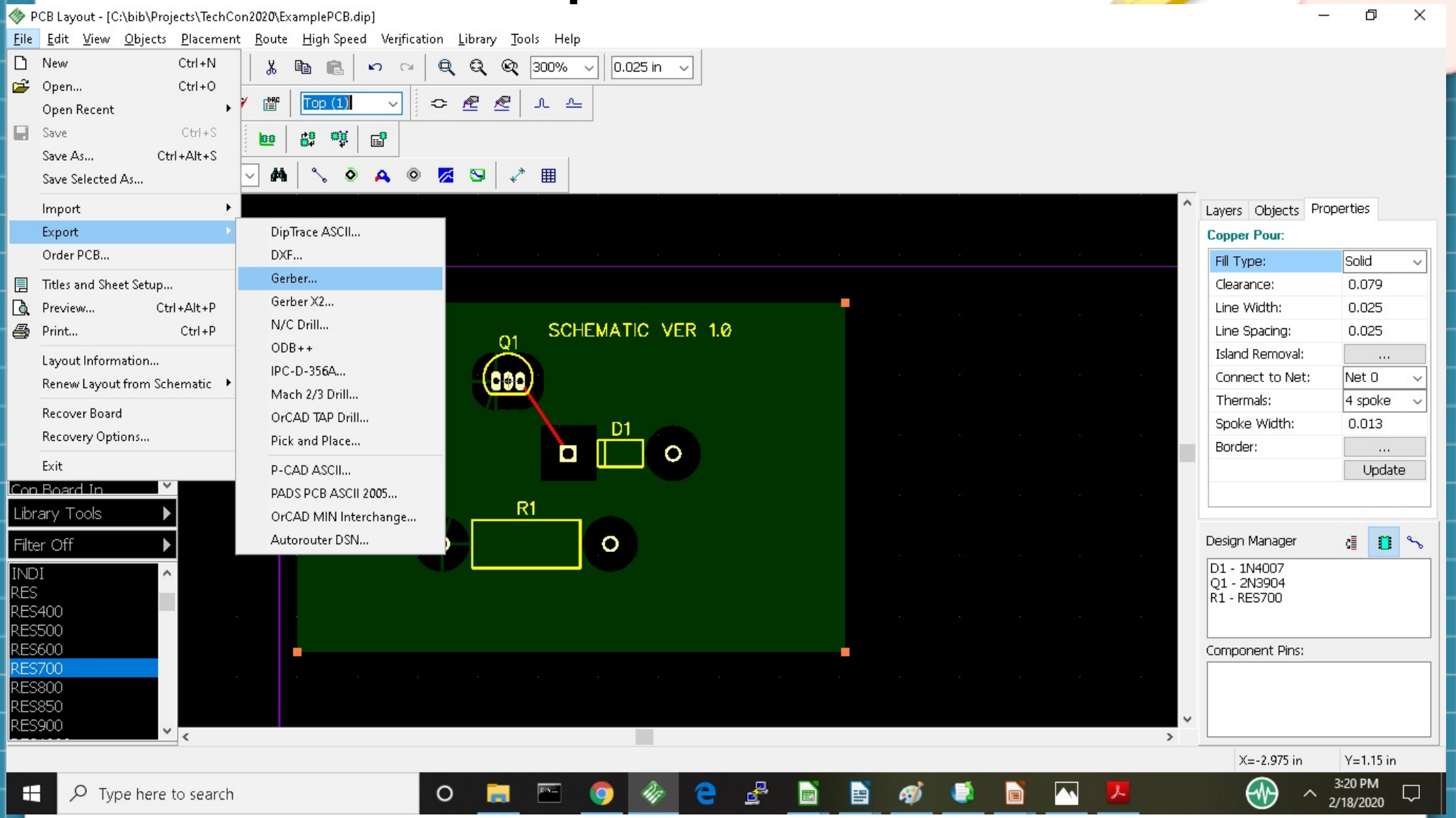
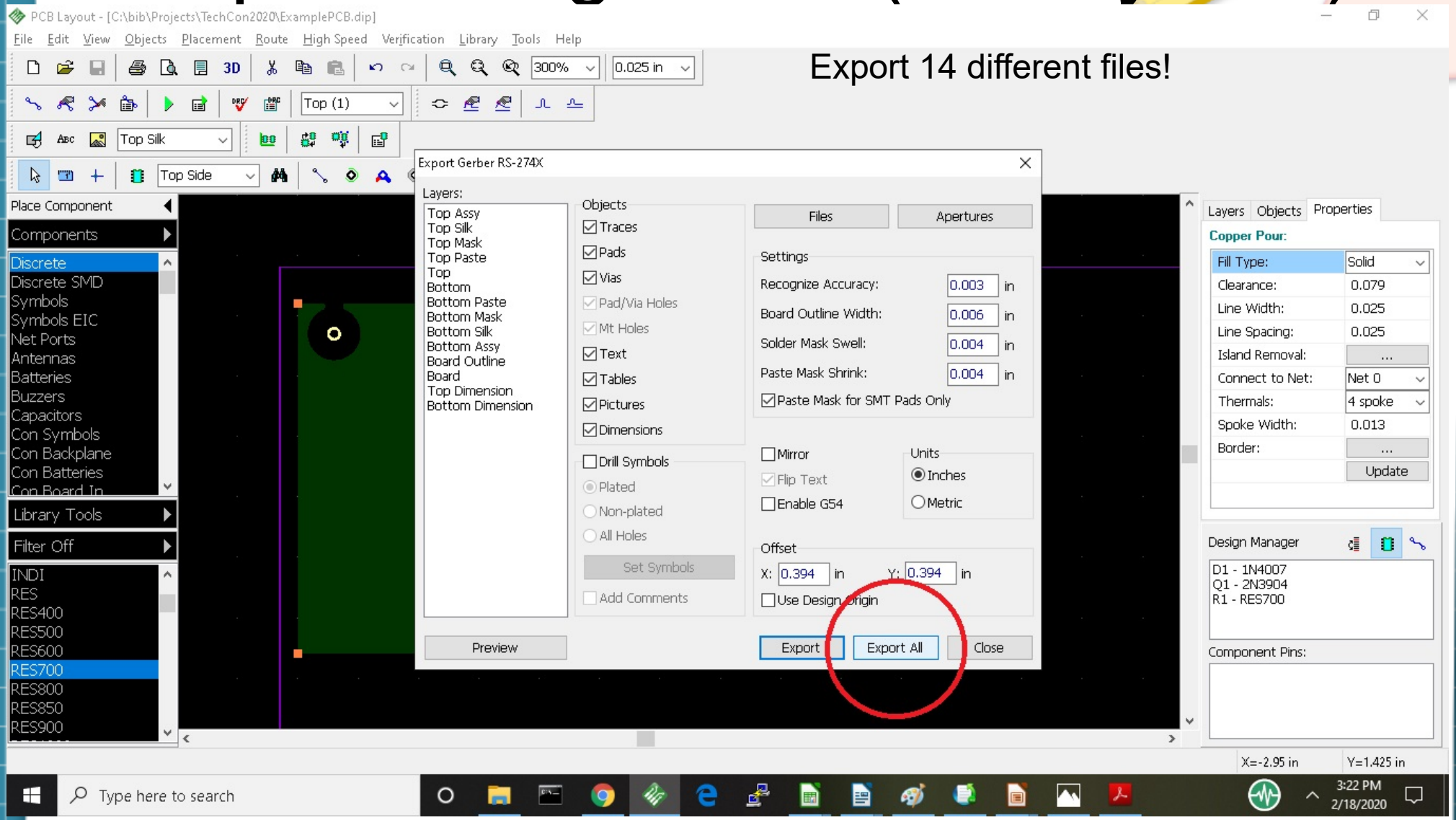
Con Backplane
Con Batteries
Library Tools
Filter Off
INDI
RES
RES400
RES500
RES600
RES700
RES800
RES850
RES900
SCHEMATIC VER 1.0
Q1
R1
PCB Layout
No errors found
OK
Layers Objects Properties
Copper Pour:
Fill Type: Solid
Clearance: 0.079
Line Width: 0.025
Line Spacing: 0.025
Island Removal: ...
Connect to Net: Net 0
Thermals: 4 spoke
Spoke Width: 0.013
Border: ...
Update
Design Manager
D1 - 1N4007
Q1 - 2N3904
R1 - RES700
Component Pins:
X=-2.4 in
Y=1.5 in
Type here to search
3:18 PM
2/18/2020

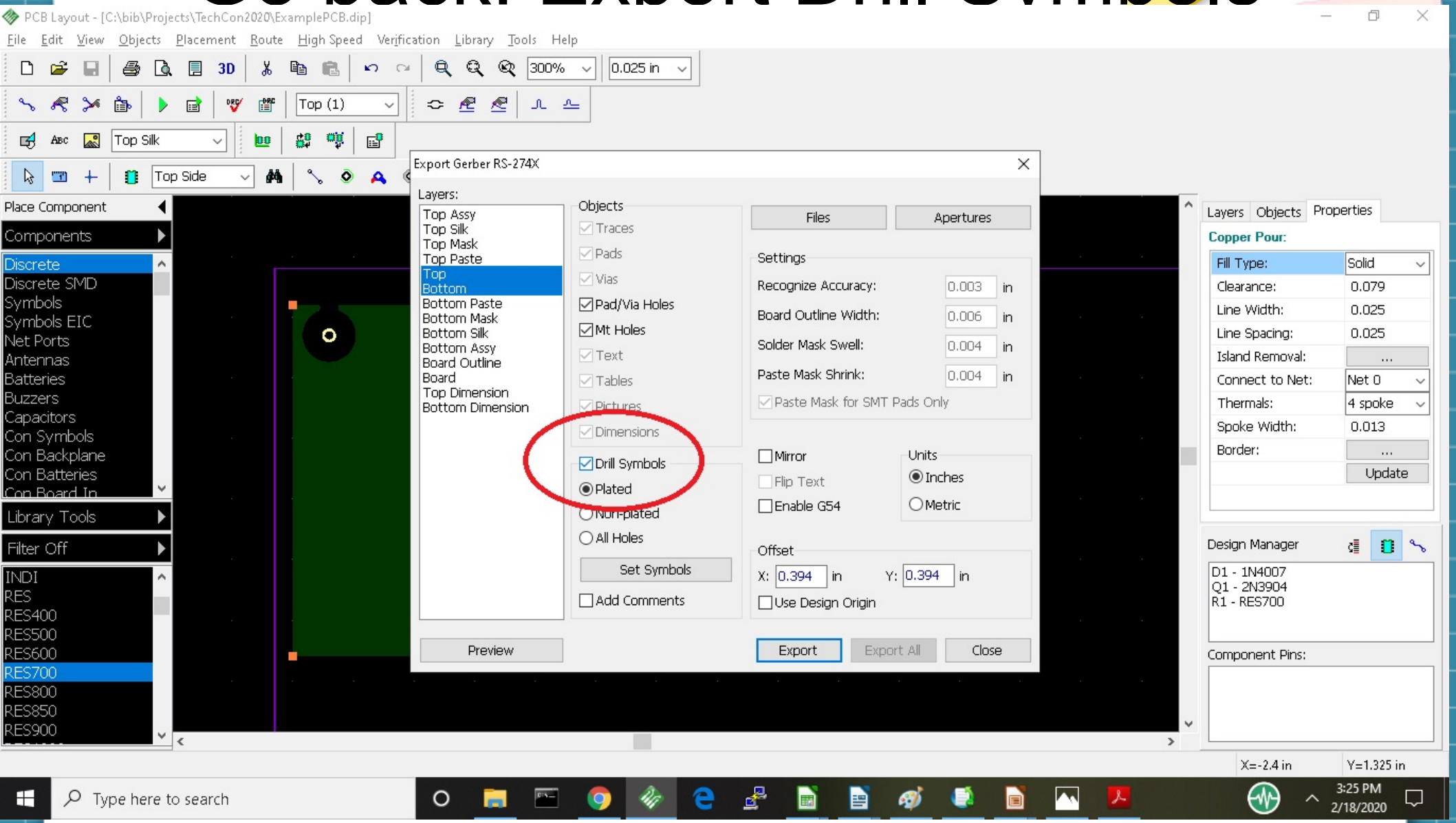
Export:Gerber



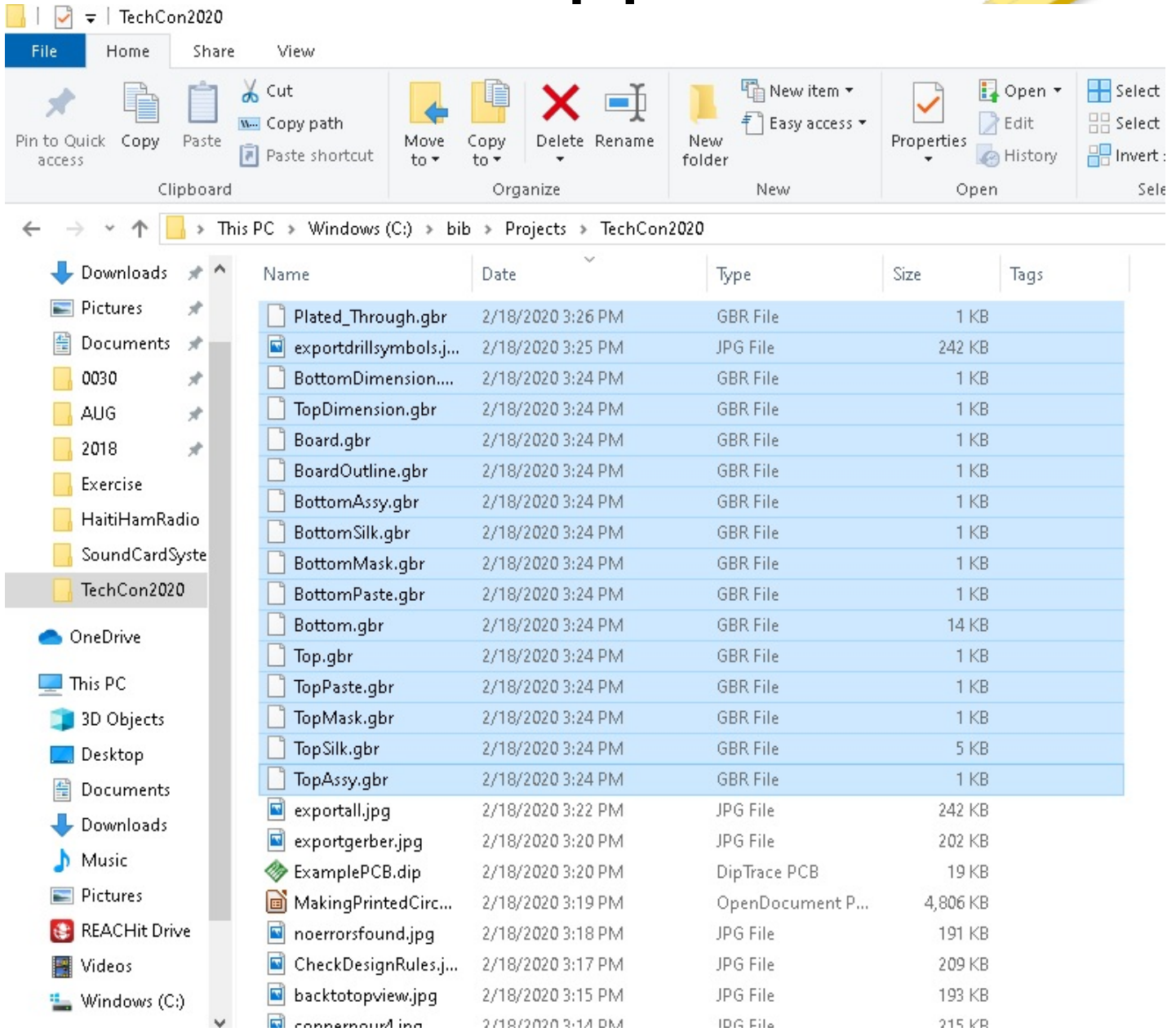
Export ALL gerbers (one by one)



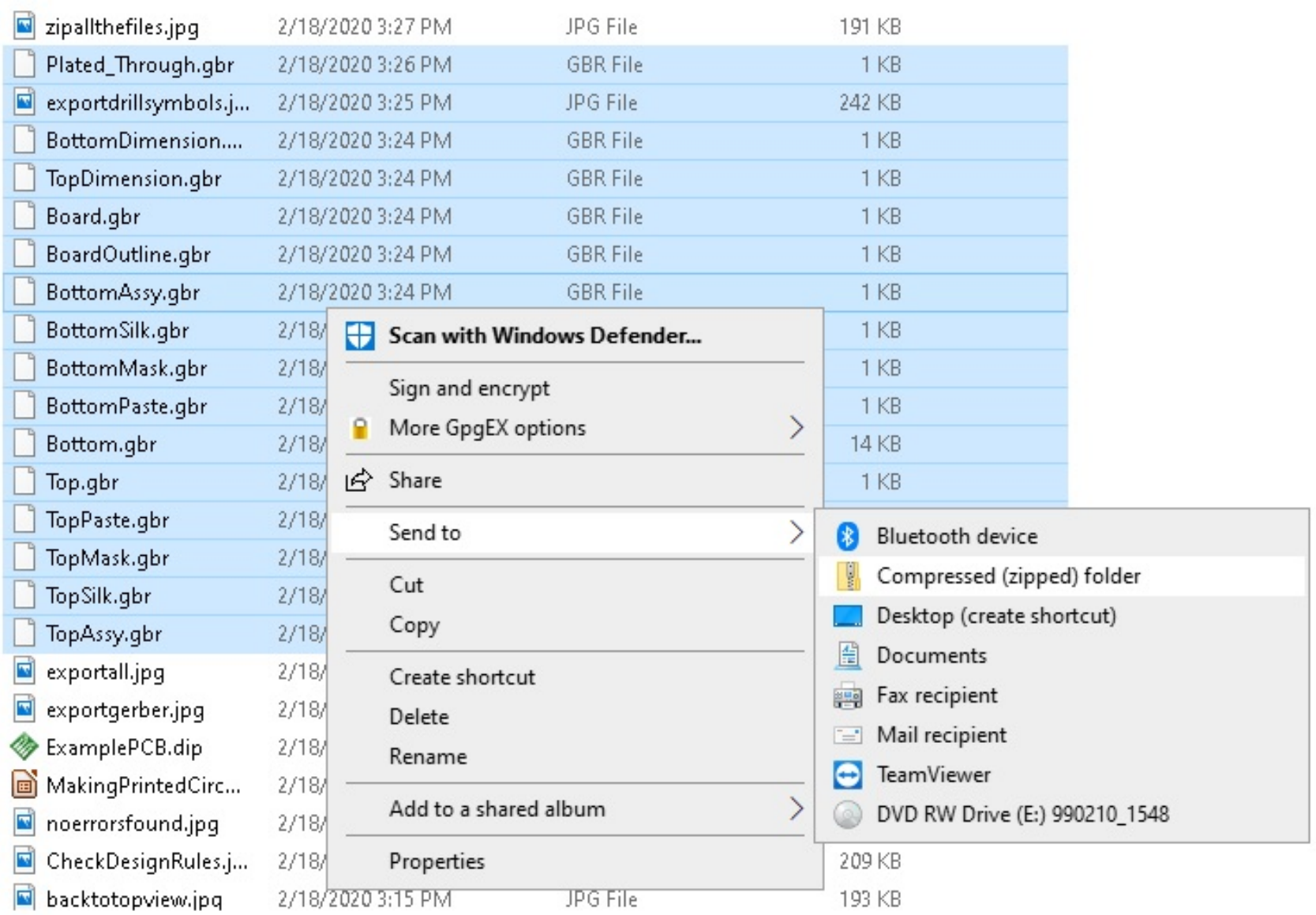
Go back: Export Drill Symbols



send all to zipped folder



Select, Right Click, Send To:

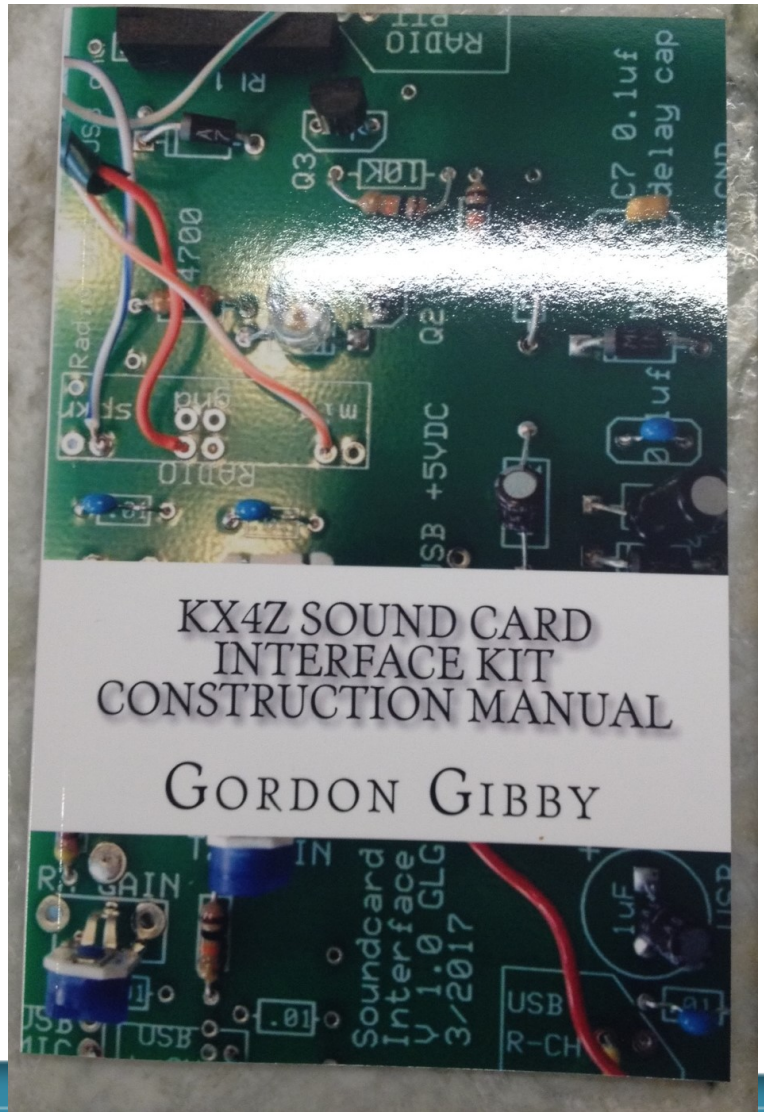


Send to China

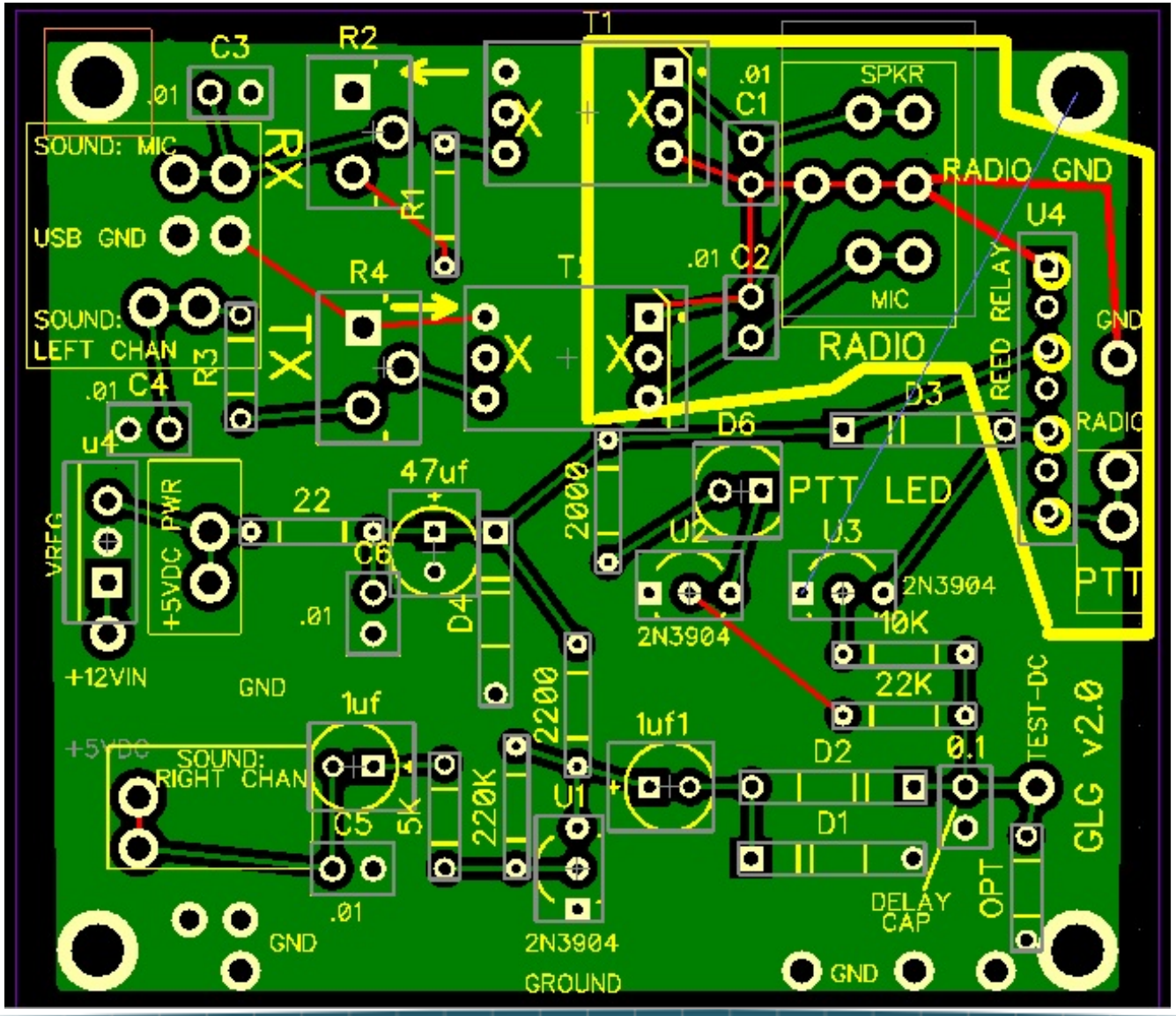
- Need to know SIZE OF BOARD
- Choose 2 layer, take defaults
- Upload your zipped file
- They will review for minutes/hours
- If missing file they will ask
- USE PAYPAL!!!!!!! O N L Y

Successful projects

- (manuals can be created with Kindle Direct Publishing)

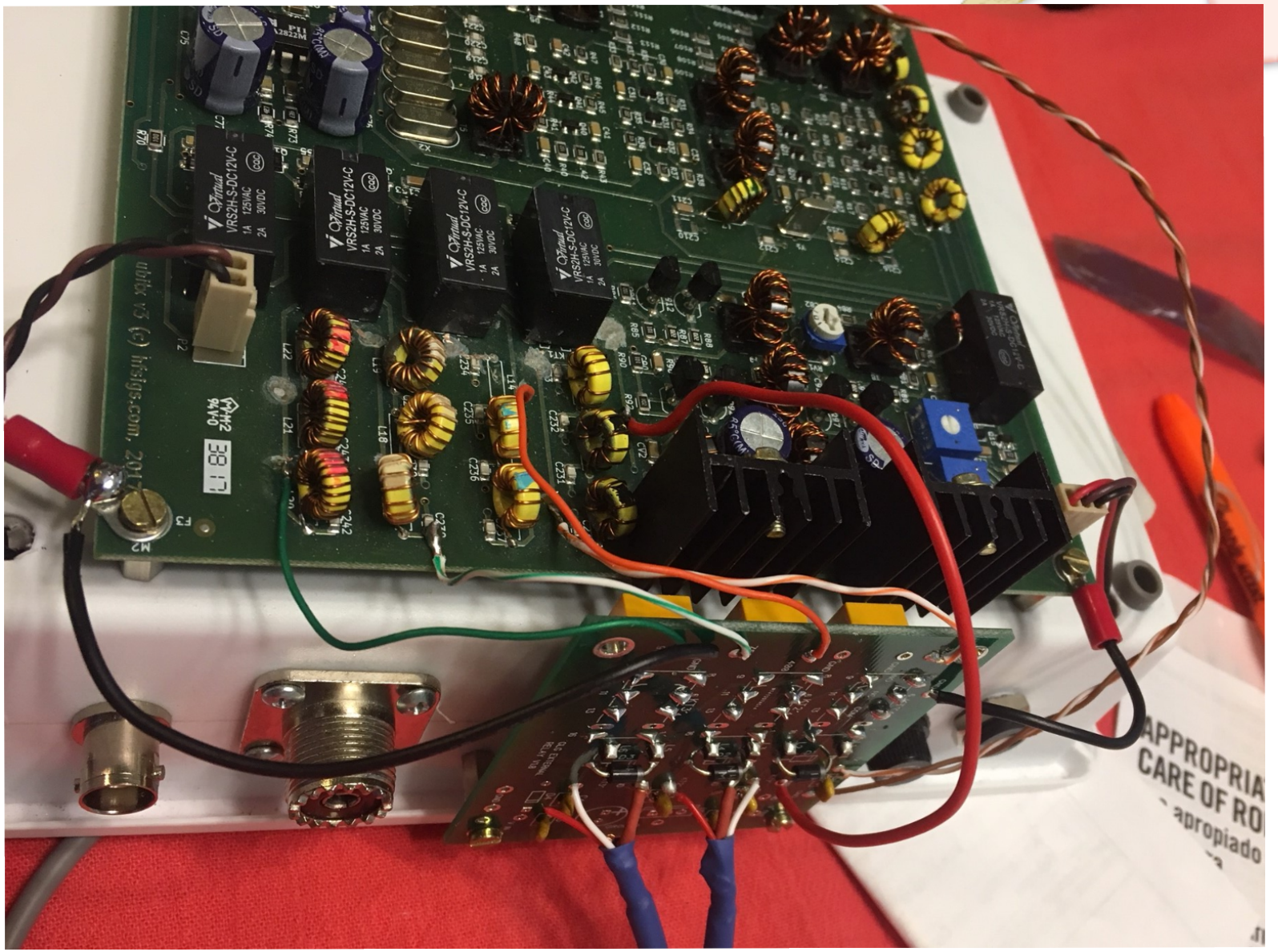


Sound Card Interface

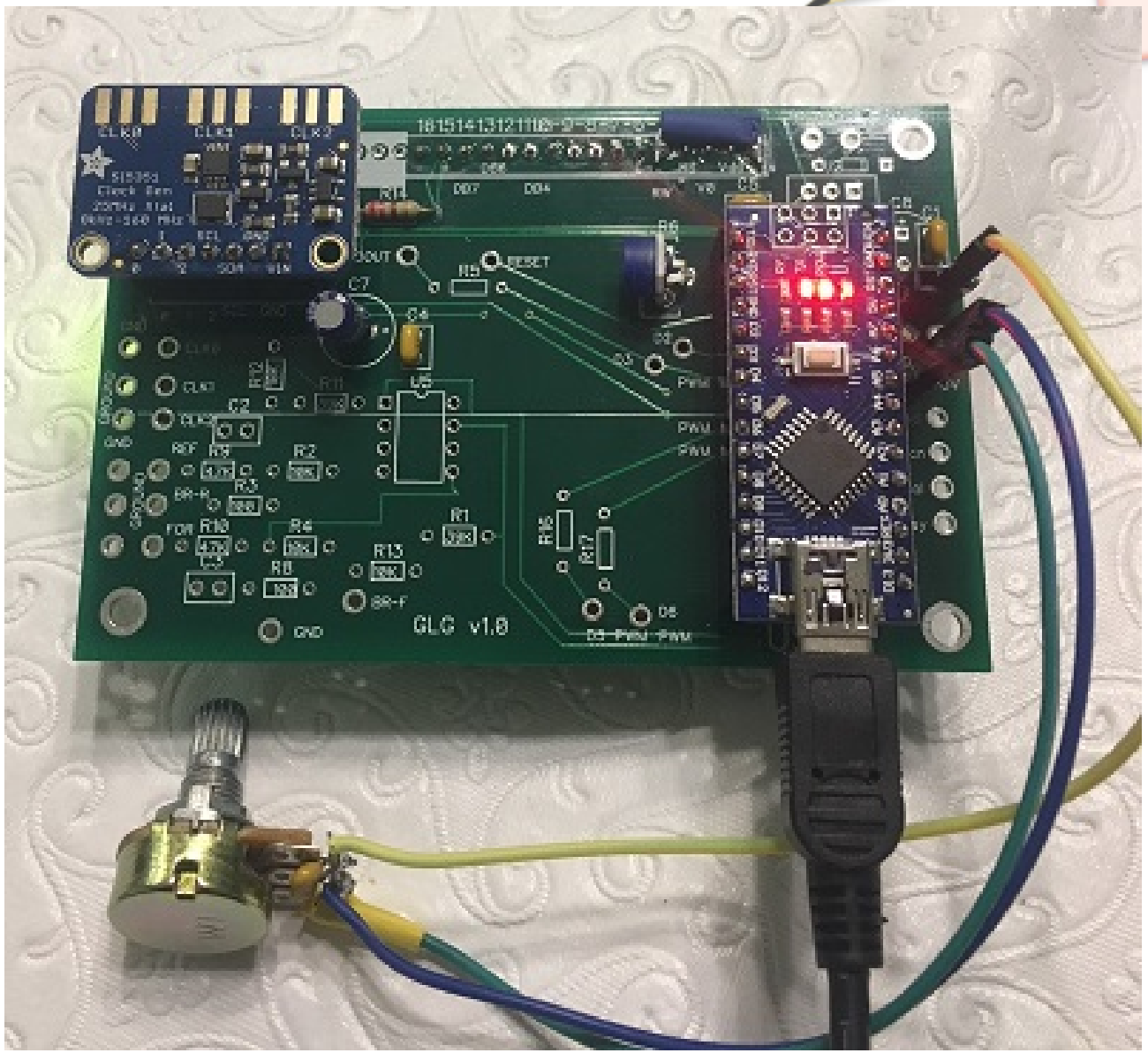


Very cheap enclosure!

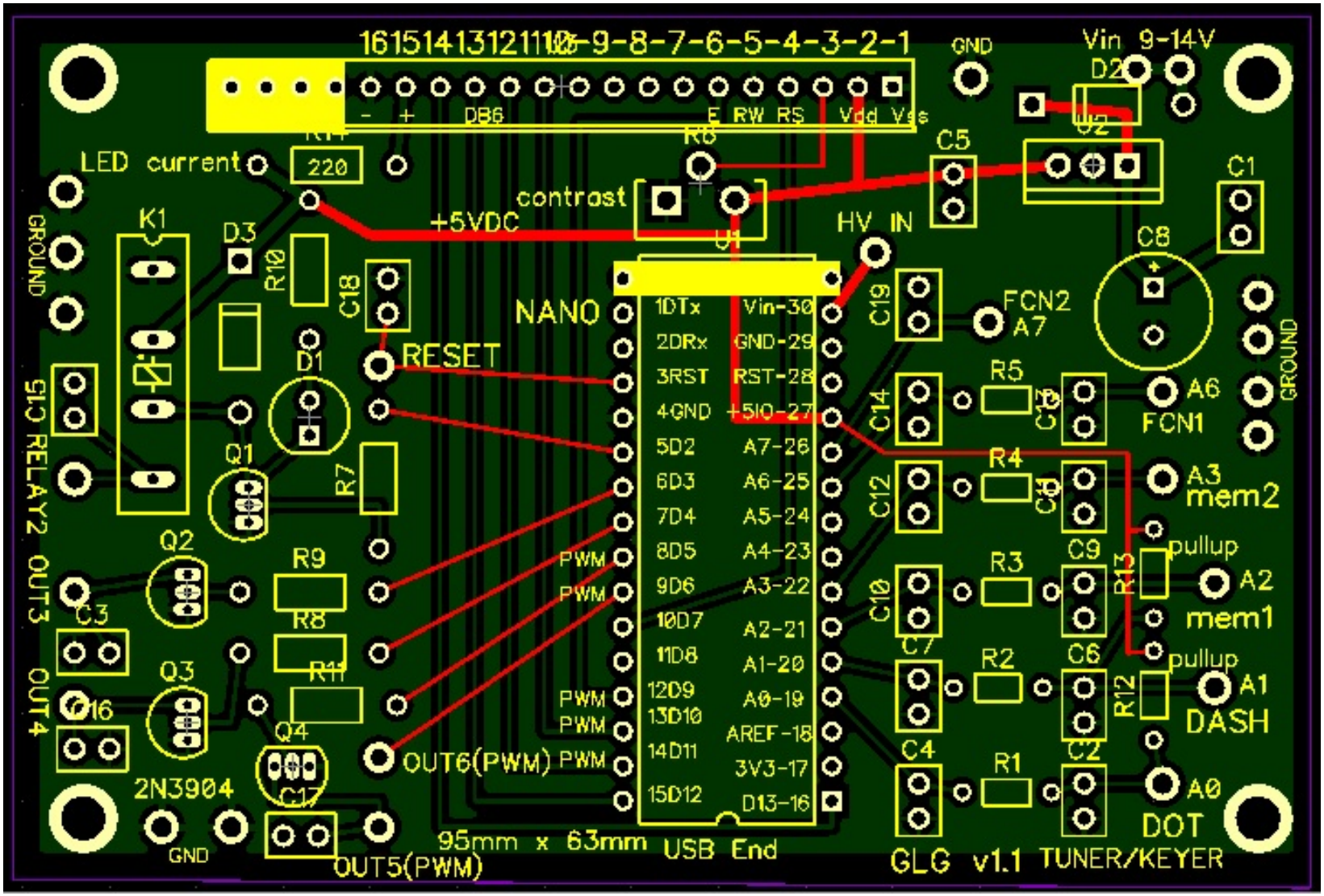
harmonic relay board

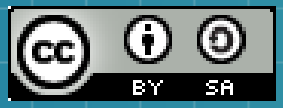


“Raduino” or SWR meter



Tuner-Keyer (Gen. Purpose)





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